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Richard M. Beck

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ARUP K. BASAK ET AL :

SERIAL NO: 09/551,051 :

ART UNIT: 1714

FILED: APRIL 18, 2000 :

EXAMINER: C. SHOSHO

FOR: WATER FAST, WATER-BASED
PIGMENTED INK-JET INK :

Assistant Commissioner for Patents
Washington, D.C. 20231

RECEIVED
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TC 1700

Sir:

The present application has been carefully studied in view of the outstanding Office Action dated August 21, 2001, and reconsideration of that Action is requested in view of the following comments.

A petition for a one month extension of time accompanies this Response together with the appropriate fee thereby extending the deadline until December 21, 2001. This Response is timely filed since it was deposited in the mail for first class delivery on the date certified on the front page thereof.

Applicants respectfully submit that the claimed invention herein is neither shown nor suggested by the prior art taken alone or in combination with one another. Specifically, claim 13 is not anticipated by Hiraoka et al US 5,980,623 ("Hiraoka"), Fuller et al US

5,017,644 ("Fuller") or Molhotra et al US 5,709,737 ("Molhotra"), for the reasons discussed below.

Additionally, claims 1-24 are not rendered obvious by the combination of Fujimatsu et al US 5,913,971 ("Fujimatsu") in view of Anton et al US 6,005,023 ("Anton") or Ma et al US 5,085,698 ("Ma"), Tsutsumi et al US 5,852,074 ("Tsutsumi"), Sano et al US 5,324,349 ("Sano") and either Lin et al US 5,531,818 ("Lin") or Nigam et al US 5,693,127 ("Nigam"), for the reasons previously submitted in the response mailed June 8, 2001, to the Office Action of December 8, 2000, as well as further comments provided below.

Continuing, applicants submit that claims 1-10, 13-14, 17-18 and 20 are not rendered obvious over the combination of Noguchi et al US 5,658,376 (Noguchi) in view of either Anton or Ma, Tsutsumi, Sano and either Lin or Nigam, for the reasons set forth in the response mailed June 8, 2001, as well the following comments.

Lastly, applicants submit that claims 1-5 and 11 are not rendered obvious by Sano in combination with either Anton or Ma and Tsutsumi, again for the reasons noted in the response mailed June 8, 2001, and for the following remarks.

Fundamentally, applicants submit that the claimed invention herein is not anticipated or suggested by the prior art for the reasons carefully explained in the response mailed June 8, 2001, as well as the following remarks. In the rejections under 35 USC §103 numerous references have been combined with one another in order to formulate such rejections. It is respectfully submitted that the Examiner is resorting to prohibited hindsight in these formulated rejections since there is no suggestion in the prior art to combine the

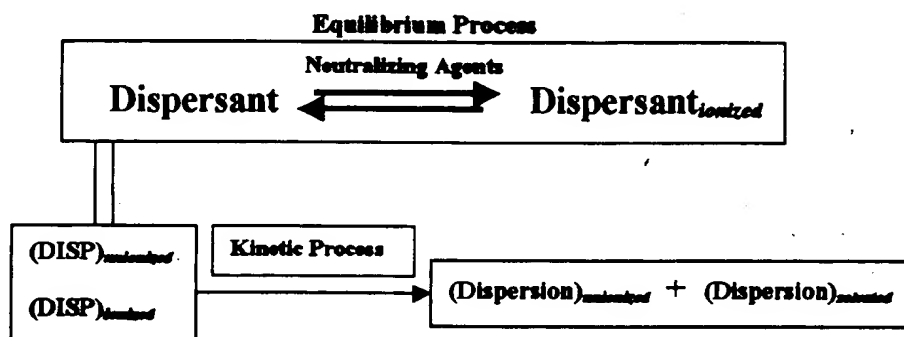
references in this manner. It is submitted that the Examiner is improperly using the present disclosure as the basis for such combination rather than relying upon prior art for suggesting such a combination of references. In reality, the prior art fails to suggest the combination of art relied upon.

According to Hiraoka, the colorants used in the invention are "dyes represented by the general formula" expressed in column 4, lines 21-65; column 5 - column 6; column 6 - column 17 all of which are Cu-Phthalocyanine derivatives. Colorant for the black color ink (ref. column 68, line 67 - column 69 and column 70, lines 5-10) is a disazo dye having carbonyl groups. These are organic dyes and not the pigments of the present application set forth in the claims. There are numerous differences in chemistry between organic dyes and pigments and one is not a substitute for the other. Hiraoka deals with organic compounds which contain some functional groups such as -OH, -NH₂, -SO₃M, X=-COOH (column 70, lines 15-16). By neutralizing with sodium hydroxide, column 91, example 1; column 92, example 2; column 3, example 3; column 95, example 4; column 96, example 5; column 97, example 6; and column 98, example 7; the colorants are the ammonium salt of the dye in the form of the compounds shown in the list of structures reported in column 71 and column 72. In Hiraoka, the colorant is soluble after converting it to ammonium salt in the ink vehicle. In chemistry that forms a "solution". Persons skilled in the art would readily agree on the differences in chemistry, physics and corresponding physical phenomena between the "solutions" of Hiraoka and the dispersions of the present invention.

In the present invention, the colorant is not soluble in the vehicle. Instead it comprises a dispersion which is completely different from Hiraoka. Moreover, although Hiraoka discloses a particular surface tension, conductivity and particle size, the Examiner is reminded that formulation of Hiraoka is based on an ammonium salt of the colorant dye soluble in an ink vehicle while the present invention is not a solution, but instead a novel dispersion of pigments. Attention is also directed to the dispersion of particles (pigments in this case) in the vehicle and the encapsulation mechanism to enhance the stability of the ink. Also, the physical parameters recited in claim 13 concern a completely different and novel formulation when compared to Hiraoka. Moreover, example 9 of Hiraoka deals with Cyan Ink (column 110).

Fuller discloses a composition where the colorant is one or more dyes (column 4, line 45). Malhotra also discloses a composition where the colorant is a dye. Dyes are significantly different from the particular pigments of the present invention. Here again, the chemistry of dyes and pigments is significantly different as well as the differences in the physical chemistry of solutions and dispersions.

With respect to the position taken by the Examiner in Office Action, page six, second paragraph, applicant submits the following. By "neutralized" it clearly means the addition of an equivalent amount of base whereas in the present invention applicants have carefully crafted the equilibrium and kinetic process in the systems depicted below pictorially.



This clearly explains the uniqueness of marrying the equilibrium and kinetic phenomena in a system. Thus, the present invention is totally different from the prior art. It is also reasonable to assume that the Examiner is fully aware of "mass balance" and "Species Distribution" in thermodynamic equilibrium process. Accordingly, the present invention is novel and unsuggested by the prior art.

With respect to the position taken by the Examiner on page six of the office Action, seventh line from the bottom, applicants rebuttal was previously explained on page four of the submission mailed on June 8, 2001, in response to the Office Action of December 8, 2000.

While it is agreed that Ma and/or Anton disclose a carrier medium, but in that carrier medium the present invention is unequivocal and completely different from the prior art. Applicant argued that the present invention does not require any heating to remove ammonia gas, not to stabilize the dispersion as noted by the Examiner in lines 11-12 of

page seven of the Office Action. It is reasonable to claim that the present invention is unique in increasing the neutralization turn over cycle which is only possible based on the schematic shown earlier. Thus, the present invention is totally different from the prior art and completely beyond ordinary skill in the art.

It is agreed that the prior art discloses the use of an acrylic emulsion for increasing optical density and use of anti-foaming agents for preventing bubble formation. Applicants emphasize, however, that Tsutsumi uses hydrophobic dyes as colorant, but the present invention is based on pigments. Furthermore, pigments are typically surface modified so that wetting of pigment particles is smooth and continuous because of matching surface energy, without any possibilities of air entrapment resulting bubbles. It is quite different from the prior art and it is not obvious to one of ordinary skill to design, develop and apply such art prior to the claimed invention herein.

The equilibrium chemistry of the anti-foaming agents and the dispersion mechanism of the colorant in the ink vehicle are implemented in the present invention process, so that the pH, conductivity and optical density are optimized. Again based on the equilibration of the media, with respect to pH, the emulsion may get protonated/deprotonated and thereby affect gloss and reflectance.

In argument (e) set forth in the outstanding Office Action, the Examiner merely cites his position in the light of the teaching of Lin or Nigam. About conductivity, the point is not the actual magnitude of conductivity, but the attainment of the attribute of the inks in the point, which is the novel feature of the present invention. While the conductivity of the ink

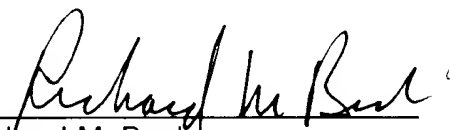
jet inks formulated via the present invention may be within the range of conductivity of the prior art, the route of developing a unique product of desired attributes is important, and thus applicants respectfully disagree with the comment "ordinary skill level" by the Examiner.

Regarding argument (f), in the prior art referenced so far, technology is based on neutralization of a dispersant resin in the media followed by additional steps in dispersing pigments. In the present formulation, applicants have utilized the theory and chemistry of equilibrium, kinetics, and dispersion to design and develop a new and unique technology for ink jet ink formulations, which was not heretofore available.

Accordingly, for the reasons set forth above it is believed this application is in condition for allowance, and early Notice to that effect is respectfully requested.

Respectfully submitted,

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